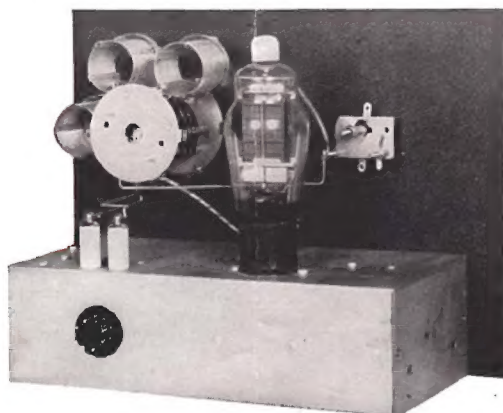




Complete Rules for All Six Coveted Ham Awards Included Pages 5, 6, 7 This Issue

GL-837 OSCILLATOR-DOUBLER

WAC
Worked
All
Continents



WBE
Worked The
British
Empire

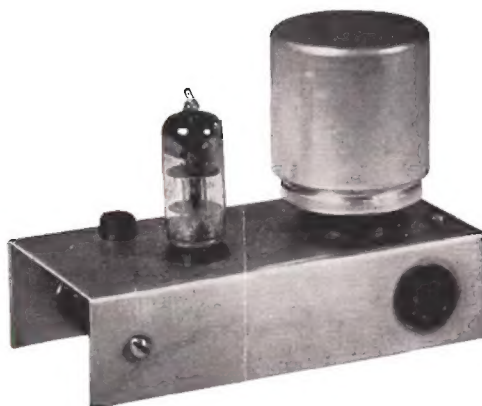
WAS
Worked
All
States

BERTA
British Empire
Radio
Transmission
Award

Rear View of GL-837 Oscillator-Doubler
(See pages 2 and 3 for complete details)

ONE-TUBE KEYING MONITOR

WAZ
Worked
All
Zones



DXCC
DX
Century
Club

(see p. 5, 6, 7)

(see p. 5, 6, 7)

Front View of the Code Monitor
(See page 4 for complete details)

The recently released country list, which formed the basis for the DX Log in the March-April issue of the G-E Ham News, and the resumption by QST and CQ magazines of the DXCC and WAZ awards, respectively, point to the fact that *there are six major amateur radio achievement awards*. In order to place this information in the form of

one easy-to-find reference, I have received permission from the above-mentioned magazines to reprint the official data. What do you say, gang?—I'm trying hard to get an award or two. How about you? Good Luck!

GL-837 OSCILLATOR-DOUBLER

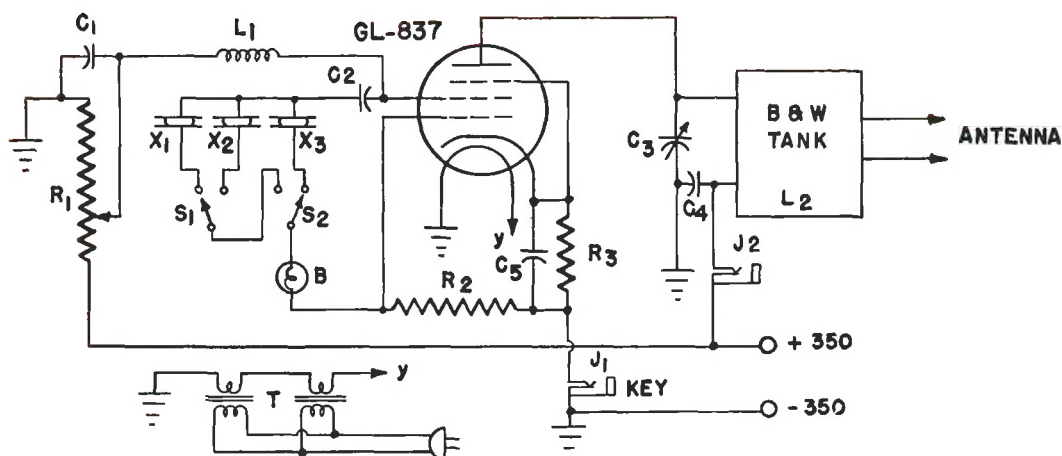


Fig. 3.—Circuit Diagram of GL-837 Oscillator-Doubler

CIRCUIT CONSTANTS

B	=0.060 ampere miniature lamp bulb	R ₁	=50,000 ohm, 50 watt semi-adjustable
C ₁ , C ₅	=0.002 mf. 400 volt mica	R ₂	=20,000 ohm, 2 watt
C ₂	=0.01 mf. 400 volt mica	R ₃	=100 ohm, 5 watt
C ₃	=see text	S ₁ , S ₂	=Single-pole, double-throw toggle switch
C ₄	=0.002 mf. 1000 volt mica	T	=Two 6.3 volt filament transformers in series (Thordarson T-19F80)
J ₁ , J ₂	=Single-circuit, normally closed jack	X ₁ , X ₂ , X ₃	=3.5 or 7 mc. crystals
L ₁	=2.5 mh. r-f choke		
L ₂	=Barker & Williamson JTEL Turret		

GENERAL FEATURES

A crystal oscillator circuit is most versatile when it is designed to allow doubling or quadrupling. The popular types of harmonic-generating crystal oscillators are the tri-tet and the grid-plate oscillator. Both of these require two tuned circuits. The GL-837 oscillator described in this issue acts either as a straight oscillator, as a doubler, or a quadrupler. Only one tank circuit is required.

Reference to the schematic diagram, Fig. 3, indicates how this circuit operates. The screen and control-grid are used as plate and grid, respectively, of a Pierce oscillator. By virtue of electron stream coupling these two elements control the plate of the GL-837 so that an effective amplifier (or doubler) stage is created. This type of circuit is not new, but it has not been widely known to amateurs.

The unit is designed to operate primarily on 80, 40 and 20 meters, as a c-w transmitter. As such, it makes an ideal beginner's transmitter. Most experienced hams will be able to use the circuit as an oscillator-driver for higher power tubes. An output of approximately ten watts is obtainable with the circuit constants and voltages as shown. An increase in power output can be obtained by an increase in plate voltage. However, in order to maintain good efficiency, the screen voltage should also be raised. This increase in screen voltage is limited to the point where the crystal current is not excessive. If the circuit is used as shown, the maximum crystal current should be from .020 to .025 amperes.

The front-panel view, Fig. 4, indicates how



Fig. 4.—Front-panel View of Oscillator-Doubler

positions are provided for three crystals. The octal socket on the left handles two small crystal holders, while the 5-pin socket will accommodate the older-type crystal holders. The toggle switch (S₁) directly above the crystal current bulb (B) selects one of two crystals which are inserted in the octal socket, while the toggle switch (S₂) mounted below the bulb selects between the octal socket or the 5-pin socket. A single-pole triple-throw switch could be used just as easily.

CIRCUIT DETAILS

The screen voltage is obtained from a bleeder, R_1 , in order to maintain good regulation. The use of a semi-adjustable resistor permits altering this voltage until optimum results are obtained.

In the plate circuit it is necessary to use a tuning condenser (C_3) which will cover the three bands (80, 40, 20 meters) and yet not allow tuning to 80 meters with the 40 meter coil, or tuning to 40 meters with the 20 meter coil. A Cardwell ZU-100-AS condenser was originally used. This selection was made because the condenser plates can be removed easily, and the proper capacitance easily found. For best operation of the unit on all three bands, it was found necessary to remove all but three rotor plates and four stator plates of the Cardwell capacitor. The approximate capacitance was then 35 mmf. The air gap on the ZU-100-AS is 0.020 inches, and this was maintained, no attempt being made to double-space the capacitor. The 10 and 15 meter coils were removed from the B&W coil assembly, as they were not needed.

Keying is accomplished in the cathode circuit by J_1 . Keying is smooth and chirpless.

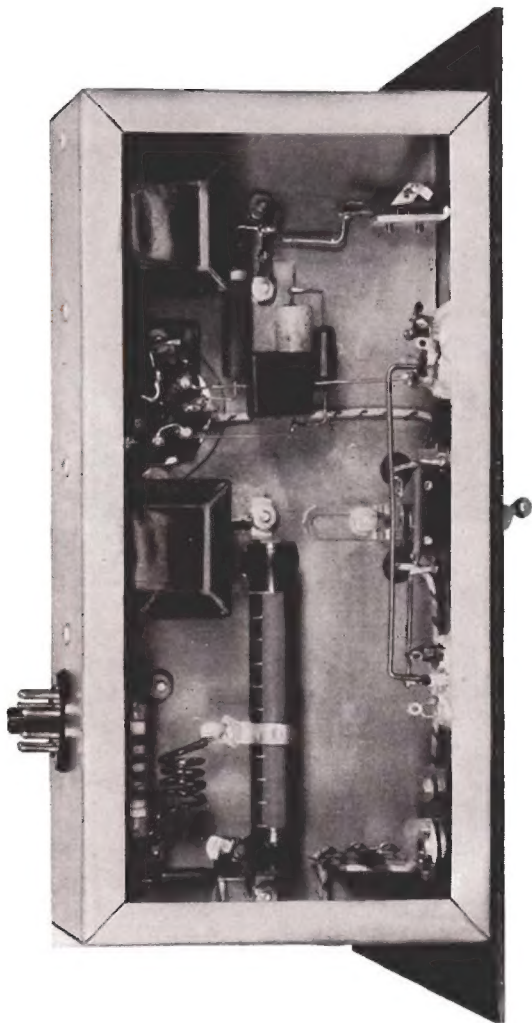


Fig. 5.—Under-chassis View of GL-837 Oscillator-Doubler

CONSTRUCTIONAL DETAILS

A 3 by 5 by 10 inch chassis is used together with a 9 by 12 inch front panel. This small unit requires very little operating-table space, and yet the panel is large enough to provide enough space for the various components which must be accessible from the front panel. The layout of parts is not critical, and almost any arrangement may be followed. Figs. 1 and 5 give the mounting details followed in this particular unit. Front panel layout including center line dimensions is shown in Fig. 4. Mounting hole sizes are not shown as various makes of components vary in actual size.

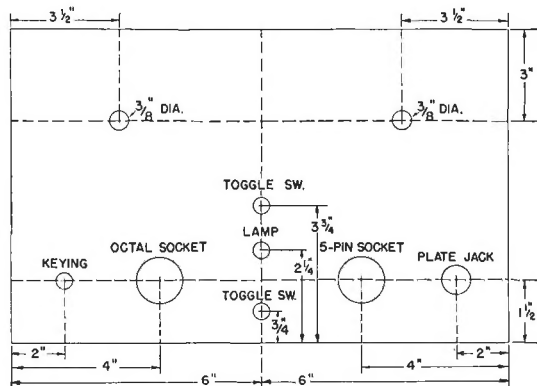


Fig. 6.—Layout of 9 by 12 inch Panel

OPERATING ADJUSTMENTS

Plate voltage should be applied and R_1 adjusted until the screen voltage is between 175 and 200 volts. A crystal should then be inserted and C_3 tuned until plate current (measured in J_2) is minimized as evidenced by the "dip." The following table indicates the performance to be expected.

PERFORMANCE TABLE

Plate voltage = 350 Screen voltage = 175

Crystal Frequency (meters)	Output Frequency (meters)	Unloaded Plate Current (mils)	Crystal Current (mils)
80	80	2	10
80	40	15	—
40	40	3	20
40	20	22	—

Under Crystal Current no data is given for doubling as the current was so low that the crystal lamp did not light. Also, no data is given for quadrupling as this type of operation depends a great deal on the activity of the crystal used. Unloaded plate current, when quadrupling, should run a little more than when the tube is doubling. Sufficient output can be obtained while quadrupling to drive a pentode or beam tube amplifier.

ONE-TUBE KEYING MONITOR

GENERAL FEATURES

Compactness and broad frequency coverage are the two main features of the keying monitor illustrated in Figs. 2 and 8. The monitor picks up radio-frequency signals of any wavelength and automatically produces an audio-frequency tone which may be used to monitor your keying.

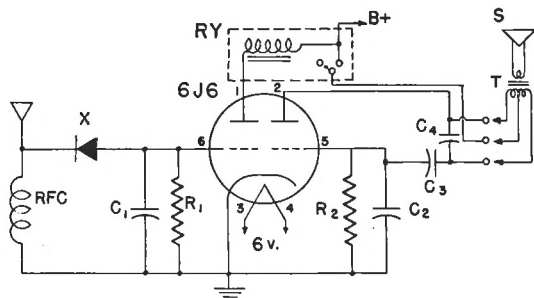


Fig. 7.—Circuit Diagram of One-tube Keying Monitor

CIRCUIT CONSTANTS

- C_1, C_2 = 500 mmf. postage stamp mica
- C_3 = 0.1 mf. paper
- C_4 = See text
- R_1 = 0.6 megohm, $\frac{1}{2}$ watt
- R_2 = 10,000 ohm, $\frac{1}{2}$ watt
- RFC = 2.5 mh. r-f choke
- RY = Sensitive relay, (G.E. CR2791-C103C25), see text
- S = Speaker, see text
- T = Audio transformer, see text
- X = Crystal rectifier, see text

With reference to the circuit diagram above, a sensitive relay, RY, is connected in the plate circuit of the first section of a General Electric 6J6. When no r-f is present on the antenna, sufficient plate current flows to energize the relay, preventing the plate voltage from reaching the second section of the 6J6. (The relay is shown in the energized position.) When a signal is impressed on the antenna, the crystal, X, rectifies the r-f signal and impresses a voltage on the grid which cuts off the flow of plate current. This de-energizes the relay and applies plate voltage to the second section of the 6J6, which acts as an audio oscillator.

This keying monitor has the advantage that it operates only when your transmitter is on the air, and for this reason is superior to a monitor which merely produces a tone when your key is down, which would be true if you were keying a relay, one pole of which keyed your rig with the other pole keying an audio oscillator. Using the 6J6 monitor, it is immediately apparent if your crystal is sluggish.

CIRCUIT COMPONENTS

The crystal, X, may be any sort of small rectifier crystal, such as the 1N34, etc. Its action is not critical. The relay, RY, may be any type of sensitive relay which incorporates a single-pole, double-throw switch, or a switch which is "on" when the relay is not energized. The relay should

be capable of picking-up on a current of approximately 4 mils. The General Electric relay shown has a coil resistance of 2400 ohms and a pick-up current of exactly 4 mils. It is designed to plug into a standard 5-pin tube socket.

The plate circuit of the right-hand section of the 6J6 uses an audio transformer as a "tank circuit." The transformer, T, and the speaker, S, it drives are not shown in the pictures. Practically any type of transformer will work. The highest impedance winding should be used on the plate side, and the low impedance winding used to drive the speaker. A permanent magnet speaker should be used. (Earphones may be used instead of a speaker.)

The value of C_4 is not specified because the exact value will depend upon your preference for the correct audio note and also upon the transformer used. Some transformers have a high enough internal capacitance that no condenser is needed. Try the circuit without any condenser at C_4 . If the tone is too high, add capacitance in steps of 0.05 mf. until the tone is suitable.

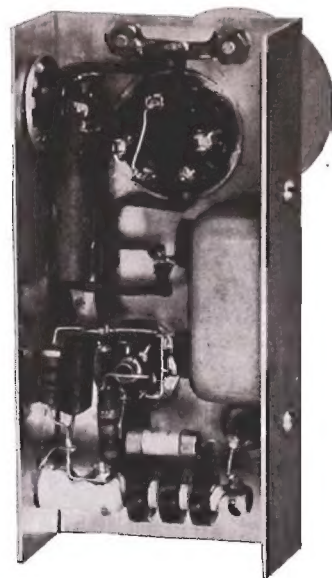


Fig. 8.—Under-chassis View of Keying Monitor

OPERATING DETAILS

The keying monitor is small enough to fit inside many receivers, or in an odd corner of your speech amplifier. Voltage requirements are low and the power can be taken from your receiver in most cases. The filament requires 6.3 volts at 0.45 ampere. The plate voltage may be any value from 45 volts to 150 volts at a current of approximately 10 mils. This value will depend somewhat on the resistance of the coil in the relay.

In operation, a single wire may be taken from the antenna post, (plug jack on top of chassis, see Fig. 2) and brought near the final stage. If increased coupling is required, a link may be used, connecting the link across the r-f choke. Coupling should be increased until the audio tone is present (when your transmitter is on). No further adjustments need be made, even when changing bands.

WAC—WAS—WAZ—WBE—BERTA—DXCC

The following information is essentially a reprint and compilation of the latest details available on the above listed awards. References are given in each case.

WAC

(QST, November, 1946)

The International Amateur Radio Union is again issuing the coveted Worked All Continents award to licensed amateurs who submit confirmations of two-way communication with an amateur station in each of the six continental areas of the world.

The required areas are North America, South America, Africa, Europe (including European Russia), Asia (including Asiatic Russia), and Oceania (Australia, New Zealand, the Philippine Islands, the Netherlands East Indies, and most of the Pacific islands).

Under the rules of the Union governing the issuance of WAC certificates, the applicant must be a member of the national amateur society of the country in which he normally resides. No fee is required from such applicants. Persons residing in a country not represented in IARU must pay a fee of 50 cents to the Headquarters before a certificate can be granted.

Applications should be sent to the headquarters of the national amateur society; if there is none, they may be sent to Union headquarters, care of ARRL. Two types of certificates are available: the regular award, and a special one for telephony. In addition, there is a 28-Mc. endorsement available if an applicant submits cards showing that all contacts took place on that band.

WAS

(Operating an Amateur Radio Station, ARRL, 24th edition)

ARRL certificates are available for those radio amateurs who "Work all forty-eight of the United States."

WAS means "Worked All States." This award is available regardless of affiliation or nonaffiliation with any organization. Here are the few simple rules to follow in applying for membership:

(1) Two-way communication must be established on the amateur bands with all forty-eight United States; any and all amateur bands may be used. The Dist. of Columbia also counts for Maryland as it was part of that state once.

(2) Contacts with all forty-eight states must be made from the same location. Within a given community one location may be defined as from places no two of which are more than 25 miles apart.

(3) Contacts may be made over any period of years, and may have been made any number of years ago, provided only that all contacts are from the same location.

(4) Forty-eight QSL cards, or other written communications confirming two-way contacts made (one from each state) must be submitted to ARRL headquarters.

(5) Sufficient postage must be sent with the confirmations to finance their return. No corre-

spondence will be returned unless sufficient postage is furnished.

(6) The WAS award is now available to all U.S. amateurs.

(7) Address all applications and confirmations to the Communications Department, ARRL, 38 LaSalle Road, West Hartford, Conn.

WAZ

(CQ, January, 1947)

In February 1936 the editors of Radio Magazine first announced a new DX yardstick, Worked All Zones. WAZ was a new DX scheme believed to be much superior to any list of countries or continents worked. The tremendous popularity since February 1936 of this DX yardstick has proven the merit of the system.

CQ, as the successor to old Radio, announces the resumption of WAZ honor roll listing in the editorial pages of our magazine. In addition, a handsome certificate suitably inscribed will be awarded to any station proving two-way communications with each of the forty established zones. Certificates will be numbered as issued.

WAZ not only provides an ultimate goal which is all the more desirable because few will probably achieve it, but more important for the average DX station, it provides a means whereby progress of different stations toward that goal may be easily compared and concisely stated.

Accordingly the zone scheme has been evolved which may be used as a basis of comparison. The zone system may be used not only by those who have worked all zones but also by others who can readily compare their progress toward the ultimate goal with that of other stations having the same objective.

The WAZ degree should of course be used only by those who have reached the goal of working all forty zones. The scheme, however, is subject to much wider application as progress toward the goal can be indicated by a designation such as "W38Z," signifying that the station has "worked thirty-eight zones."

In order to obtain the WAZ certificate, documented proof of contacts are required. Verifications should be directed to CQ Magazine, 342 Madison Avenue, New York 17, N. Y.

In addition to the WAZ honor itself, CQ Magazine will list a Zone and Country Honor Roll in each issue. To enter the Honor Roll it is necessary to submit a list of Zones and countries worked. Confirmations are not required. Right is reserved to exclude any stations on your lists which are known to be pirates. Zone and country lists, both "postwar" and "all-time," must be compiled in accordance with the new 1947 official Country List. Sequence in the Honor Roll will be determined by the number of postwar Zones worked. After the zone total will be the number of postwar countries worked. Following this will be listed the "All-time" totals of zones and countries.

WAZ (Cont'd)

The "C.W. and Phone" portion of the Honor Roll will contain the totals of those who operate both, while the "phone" column will contain totals of "Phone-to-Phone" only contacts.

Once your totals are entered and additional zones and countries are worked, simply submit the information on the new ones.

In order to facilitate our handling of the compilation of the Honor Roll the lists should be somewhat standard in form. The information required: (1) Call of Station worked, (2) country or (Zone), (3) date, (4) time.

(The official list of zones will be found in CQ Magazine, January 1947, Pg. 23.)

WBE and BERTA

(QST, June, 1939)

The Radio Society of Great Britain announces it has decided to allow any licensed radio amateur in the world to qualify for the "Worked the British Empire" (WBE) certificates, and "British Empire Radio Transmission Award" (BERTA). We quote below the rules governing the issuance of the certificates:

WBE

1. WBE Certificates will be awarded by the Radio Society of Great Britain, to any fully licensed radio amateur who has satisfied the Council of that body that he or she has effected two-way communication, on amateur frequencies, with at least one British Empire amateur station located in each of the five recognized Continental areas as defined by the International Amateur Radio Union (North and South America shall count as one Continental area).

2. WBE Certificates will be issued free of charge to members of the Radio Society of Great Britain.

3. In the case of non-members of the Radio Society of Great Britain, each certificate will be issued on payment of 2/6, or an equivalent amount in other currency.

4. Separate WBE Certificates will be issued for:

- a) Two-way Telegraphy working on any band except 28 Mc.
- b) Two-way Telephony working on any band except 28 Mc.
- c) Two-way Telegraphy working on 28 Mc.
- d) Two-way Telephony working on 28 Mc.

5. In forwarding a claim the applicant shall give a guarantee in writing that his or her licensed power was not exceeded in effecting the contacts upon which the claim is based.

6. A minimum readability report of 3 shall be recorded on each card submitted.

7. Applications shall be forwarded by registered post to the Secretary-Editor, Radio Society of Great Britain, 53 Victoria Street, London, S.W. 1, and each such application shall be accompanied by

documentary proof in the form of cards or letters showing that two-way working has taken place.

8. In the case of claims for Telephony awards the cards or letters shall show clearly that two-way telephony communication took place.

9. Contacts with British Mobile stations (excluding ships) located in the British Empire will be considered as British Empire contacts, providing the exact location of the station at the time of contact is clearly given in the evidence submitted.

10. British Mandated Territories, and Protectorates, shall be considered, for the purpose of these Awards, as forming part of the British Empire.

11. Contacts with Iraq made prior to January 1, 1936, and with Egypt made prior to August 1, 1937, shall be considered as British Empire contacts for the purpose of these awards.

12. Persons to whom WBE certificates have been issued are permitted to use the letters "WBE (CH)" on personal correspondence. The letters (CH) signify Certificate Holder.

BERTA

1. The BERTA will be awarded by the Radio Society of Great Britain, to any fully licensed radio amateur who has satisfied the Council of that body, that he or she has effected two-way communication, on amateur frequencies, with at least 25 of the British Dominion Districts given in Appendix I, and with at least 15 of the British Colonial areas given in Appendix II.

2. Applications shall be forwarded by registered post to the Secretary-Editor, Radio Society of Great Britain, 53 Victoria Street, London, S.W. 1, and each such application shall be accompanied by documentary proof in the form of cards or letters showing that two-way working has taken place. Evidence of two-way contacts made during the Annual BERU Contests may be submitted, providing full details are given and that the contact or contacts were made not more than two years prior to the date of the application.

3. Rules 2, 3, 5, 6, 9, 10, 11 and 12 of the WBE award also apply here, substituting "BERTA" where "WBE" appears.

Appendix I

For the purposes of the British Empire Radio Transmission Award, the British Dominion Radio Districts are regarded as:

Australia: VK 2, 3, 4, 5, 6, and 7

British Isles: G, GI, GM, GW and EI

Canada: VE 1, 2, 3, 4, and 5

Newfoundland: VO

India: VU

New Zealand: ZL 1, 2, 3, and 4

South Africa: ZS (or ZT or ZU) 1, 2, 4, 5, and 6

To qualify for the Award, contacts must be confirmed with 25 out of the 27 Radio Districts listed above.

Appendix II

(Due to its length, the list of British Colonial Areas is not included in the G. E. Ham News. Further, some of the listings may be out of date. The complete list will be found on P. 49 of the June, 1939, QST.)

DXCC

(QST, March, 1947)

1. The Century Club Award Certificate for confirmed contacts with 100 or more countries is available to all amateurs everywhere in the world.

2. Confirmations must be submitted direct to ARRL headquarters for all countries claimed. Claims for a total of 100 countries must be included with first application. Confirmation from foreign contests logs may be requested in the case of the ARRL International DX Competitions only, subject to the following conditions:

a) Sufficient confirmations of other types must be submitted so that these, plus the DX Contest confirmations, will total 100. In every case, Contest confirmations must not be requested for any countries from which the applicant has regular confirmations. That is, Contest confirmations will be granted only in the case of countries from which applicants have no regular confirmations.

b) Look up the Contest results as published in QST to see if your man is listed in the foreign scores. If he isn't, he did not send in a log and no confirmation is possible.

c) Give year of Contest, date and time of QSO.

d) In future DX Contests, do not request confirmations until after the final results have been published, usually in one of the early fall issues. Requests before this time must be ignored.

3. The ARRL Countries List, printed periodically in QST, will be used in determining what constitutes a "country." (February 1947 QST contains the postwar ARRL list.)

4. Confirmations must be accompanied by a list of claimed countries and stations to aid in checking and for future reference.

5. Confirmations from additional countries may be submitted for credit each time ten additional confirmations are available. Endorsements for affixing to certificates and showing the new confirmed total (110, 120, 130, etc.) will be awarded as additional credits are granted. ARRL DX Competition logs from foreign stations may be utilized for these endorsements, subject to conditions stated under (2).

6. All contacts must be made with amateur stations working in the authorized amateur bands or with other stations licensed to work amateurs.

7. In cases of countries where amateurs are licensed in the normal manner, credit may be claimed only for stations using regular government-

DXCC (Cont'd)

assigned call letters. No credit may be claimed for contacts with stations in any countries in which amateurs have been temporarily closed down by special government edict where amateur licenses were formerly issued in the normal manner.

8. All stations contacted must be "land stations" . . . contacts with ships, anchored or otherwise, and aircraft, cannot be counted.

9. All stations must be contacted from the same call area, where such areas exist, or from the same country in cases where there are no call areas. One exception is allowed to this rule: where a station is moved from one call area to another, or from one country to another, all contacts must be made from within a radius of 150 miles of the initial location.

10. Contacts may be made over any period of years from November 15, 1945, provided only that all contacts be made under the provisions of Rule 9, and by the same station licensee; contacts may have been made under different call letters in the same area (or country), if the licensee for all was the same.

11. All confirmations must be submitted exactly as received from the stations worked. Any altered or forged confirmations submitted for CC credit will result in disqualification of the applicant. The eligibility of any DXCC applicant who was ever barred from DXCC to reapply, and the conditions for such application, shall be determined by the Awards Committee. Any holder of the Century Club Award submitting forged or altered confirmations must forfeit his right to be considered for further endorsements.

12. **OPERATING ETHICS:** Fair play and good sportsmanship in operating are required of all amateurs working toward the DX Century Club Award. In the event of specific objections relative to continued poor operating ethics an individual may be disqualified from the DXCC by action of the ARRL Awards Committee.

13. Sufficient postage for the return of confirmations must be forwarded with the application. In order to insure the safe return of large batches of confirmations, it is suggested that enough postage be sent to make possible their return by first-class mail, registered.

14. Decisions of the ARRL Awards Committee regarding interpretation of the rules as here printed or later amended shall be final.

15. Address all applications and confirmations to the Communications Department, ARRL, 38 La Salle Road, West Hartford 7, Conn.

(The new DXCC award does not cancel your prewar DX work. If you worked fewer than 100 countries before the war and have since worked and confirmed a sufficient number to make the 100 mark, the DXCC is still available. See P. 74 of June 1946 QST for complete details.)

TECHNICAL INFORMATION

GL-837

GENERAL CHARACTERISTICS

Electrical

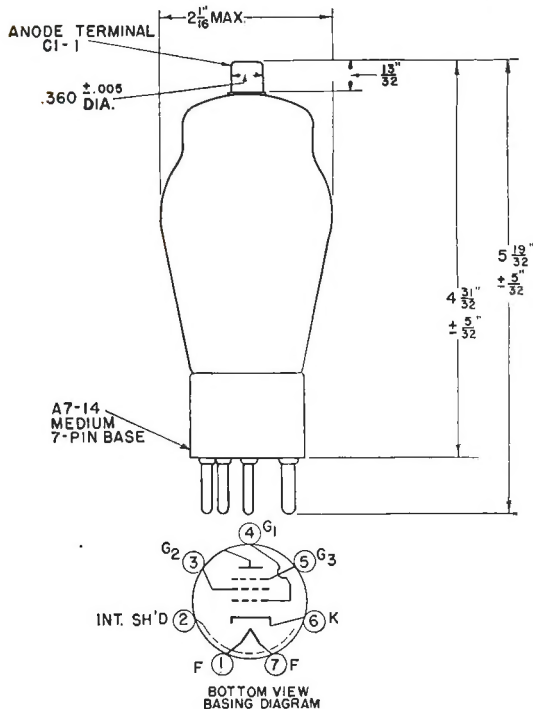
Cathode-heater type

Heater voltage, a-c or d-c.....	12.6 volts
Heater current.....	0.7 ampere
Transconductance, for plate current of 24 ma.....	3400 micromhos
Direct interelectrode capacitances	
Grid-plate, with external shielding.....	0.20 micromicrofarad
Input.....	16 micromicrofarads
Output.....	10 micromicrofarads
Frequency for maximum ratings.....	20 megacycles

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

As Radio-frequency Power Amplifier and Oscillator Pentode—Class C Telegraphy. Key-down Conditions per Tube without Modulation†

	Typical Operation			Maximum Ratings
D-c plate voltage.....	400	500	500	500 volts
D-c suppressor voltage.....	0	0	40	200 volts
D-c screen voltage.....	200	200	200	200 volts
D-c grid voltage**.....	-40	-85	-75	-200 volts
Peak r-f grid voltage.....	70	120	100	volts
Internal shield.....	connected to cathode at socket			
D-c plate current.....	70	60	60	80 milliamperes
D-c screen current.....	32	30	15	milliamperes
D-c grid current, approximate.....	8	8	4	8 milliamperes
Plate input.....				32 watts
Suppressor input.....				5 watts
Screen input.....				8 watts
Plate dissipation.....				12 watts
Screen resistor.....	6300	10000	20000	ohms
Grid resistor.....	5000	10600	18700	ohms
Driving power, approximate.....	0.5	0.8	0.4	watts
Power output, approximate.....	16	20	22	watts



** The total effective grid-circuit resistance should not exceed 25000 ohms.

† Modulation, essentially negative, may be used if the positive peak of the audio-frequency envelope does not exceed 115 per cent of the carrier conditions.

The GL-837 is a pentode transmitting tube for use as a radio-frequency amplifier, frequency-multiplier, oscillator, and suppressor-, grid- or plate-modulated amplifier. The plate connection is brought out through a separate seal at the top of the bulb to maintain low grid-plate capacitance. Neutralization is generally unnecessary in adequately shielded circuits. The suppressor and the special internal shield are connected to individual base pins. The 837 may be operated at maximum ratings at frequencies as high as 20 megacycles. The maximum plate dissipation is 12 watts.

CQ CQ The Guillotine Converter scheduled for this issue will appear in next issue.

Lighthouse Larry

Electronics Department

GENERAL ELECTRIC

Schenectady, N. Y.

(In Canada, Canadian General Electric Company, Ltd; Toronto, Ont.)